

MUSCULO-SPIRAL PARALYSIS, COMPLICATING FRACTURE OF THE HUMERUS.

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IN 562 cases of simple fracture of the humerus treated during the past twelve years at the Chambers Street Hospital, in New York, but three cases of musculo-spiral paralysis are to be found. Bilroth, during a period of sixteen years in his clinic at Vienna, saw only three cases. Bruns was the first to accomplish the collection and classification, and his results are most interesting. He shows that while injury and compression of nerves in connection with fracture is of uncommon occurrence, still the complication is decidedly more frequent than has generally been supposed. He has collected the large number of 189 cases of nerve injuries with fractures, and all but 21 cases are simple fractures. Of the 189 cases, over two-thirds (135 cases) were connected with nerves of the upper extremity, and of these 135 cases, 77 concerned the musculo-spiral nerve alone, and 2 cases involved the ulnar and median in addition. He found that the humerus was the bone most frequently complicated with nerve lesions, and the musculo-spiral the nerve most often concerned. Thus, in 101 cases of fracture of this bone attended with paralysis, there were 73 examples involving the musculo-spiral nerve. As to the seat of fracture, the lower and middle thirds were the most dangerous for this nerve, as shown by 4 times in the upper, 25 times in the middle, and 19 times in the lower third. Certainly these results show that the complication in question is not a rare one. Primary paralysis was more than twice as frequent (62 cases) as the secondary variety (25 cases), and of the former class the great majority (44 cases) were caused by contusion of the nerve, while in the secondary variety almost all cases were due to compression by callus and

cicatrical tissue. Bruns's collection of cases ends with the year 1885, and in examining the literature since that year only five cases have been found. To these I am able to add the following case :

R. S., seven years of age, on March 25, 1891, was run over by a wagon and sustained a simple fracture of the humerus about the middle third. An ambulance surgeon reduced the fracture, applied a right-angled splint, and removed the boy to a hospital. That night the boy developed measles, and on the following day was removed to another institution. Here he remained about six weeks for treatment of the measles, and the fracture apparently received but little attention. On returning home, the splint was removed and the arm was found to be crooked, with loss of power in forearm and hand. On June 10th examination revealed well-marked deformity at the middle of right arm, a bowing outward and backward ; and at this point was felt a prominence, evidently the upper extremity of lower fragment. Very little evidence of callus, no pain or crepitus, and a suspicion of false point of motion. Measuring both arms from acromion to olecranon shows a shortening of an inch and a quarter of right arm. Power of extension of forearm remains, but supination of forearm, extension of wrist, and radial flexion lost, "wrist drop" marked, also impaired extension and abduction of thumb. Fingers flexed, but, on passive extension of proximal phalanges, extension of terminal phalanges is normal. Some atrophy of supinators and extensors, but they respond to faradism ; sensory disturbances slight. Incision was made two inches long on outer side of arm carried down to site of fracture, as nerve was not seen ; the incision was carried downward and nerve exposed in its course between brachialis anticus and supinator longus muscles. On following the nerve up from this point, it was found firmly adherent to and tightly stretched over the edge of the lower fragment, which was dislocated upward and outward. At the point of compression the nerve was smaller, completely flattened out, and of a dark-red color, which extended a short distance above and below. Incision through periosteum, chisel inserted, and the edge of fragment removed ; the nerve released and held to one side. On examination of fracture, the lower fragment was seen dislocated as mentioned, rotated strongly inward, and united to the upper fragment at an angle of 150° . The arm was refractured by cutting through the callus with a chisel and straightening the member with the hands. Ends of fragments smoothed off with rongeur forceps and approximated with a strand of silkworm gut passing through holes drilled through the bone.

Periosteum united by catgut, wound disinfected and united by a few deep and superficial catgut sutures. Splints removed in six weeks. Four weeks after operation there was some power of extension of fingers, and from that time his history is of steady improvement. Eight weeks after operation there was good use of arm, but not complete restoration. Late in September he returned to hospital with a small fluctuating swelling over site of wound; incision let out a small amount of pus in which was found the silkworm gut. Wound soon healed, and he left with perfect and complete restoration of the right arm. On questioning the boy closely, he said that he was able to extend the hand and fingers immediately after the accident, and that the movements were not abolished until some time after his admission to the institution where he was treated for the measles. Four or five weeks elapsed before the fracture was examined, so it is fair to presume that the dislocation took place some time after the original application of splints. The case, therefore, is of some significance, as it is an example of compression of the nerve through secondary dislocation of a fragment, of which only few cases are on record.

The addition of the eleven cases collected in this paper to the number collected by Bruns makes ninety cases in all—certainly not a small number. Of this number, thirty-eight (forty-two per cent.) were treated by operation, and in almost all the nerve function was restored. While in thirty-four cases neurolysis was performed, in only three cases was the nerve sutured, showing the rarity of complete division of the nerve. Of the cases treated by neurolysis, the great majority (twenty-two cases) were examples of compression due to callus or cicatricial tissue; only seven were due to compression by a dislocated fragment. It is interesting to know that a large percentage were treated by operation, and that the results were mostly successful. Where paralysis is due to compression by callus, cicatricial tissue, or dislocated fragments, already consolidated, in my opinion the earlier the nerve is liberated the sooner will the patient be cured. Some authors advocate, however, waiting for months to see whether Nature will not effect the cure. Where the paralysis is due to the contusion of the nerve, and if no improvement appears in four to five months after the injury, I think exposure of the nerve is indicated. In such cases the nerve substance may be destroyed and replaced by fibrous tissue, which can be removed and nerve suture applied, or compression by a small fragment of callus or a

fine band of cicatricial tissue may be found. A point worthy of mention in the performance of neurolysis is to expose the nerve, not at the point of compression, but rather at some distance above or below, and then follow it up to the desired spot. By so doing, one lessens the risk of injuring or cutting the nerve in our attempt to find it when enveloped in a mass of callus or cicatricial tissue. Finally, in the examination of every case of fracture of the humerus, it is wise to look for an injury of the musculo-spiral nerve before applying the splints; otherwise the injury may be overlooked and not discovered until the appliances are removed, and it will then be impossible to say whether the paralysis was due to the injury or not.

In conclusion, I would state that this paper has been prepared to show that the musculo-spiral paralysis is not so infrequent in connection with simple fracture of the humerus, and also to place on record the case which came under my care.